U.S. ARMY TECHNICAL CENTER FOR EXPLOSIVES SAFETY

EXPLOSIVES SAFETY

Special Edition Savanna, IL 61074-9639 June 1995

FIRE FIGHTING

Recent Department of Defense Explosives Safety Board (DDESB) explosives safety surveys indicate some installations have inadequate training/knowledge in fighting fires near or involving ammunition. This bulletin addresses fire prevention and actions to take when fire is discovered near ammunition or when ammunition becomes involved in fires.

FIRE PREVENTION

The best way to fight fires is to prevent them from happening, therefore, a major element of any explosives safety program is FIRE PREVENTION. This section of the bulletin provides an outline of the major elements of a fire prevention program for installations storing, handling, or using explosives and ammunition. For further guidance, use draft DAP 385-64, 13 August 1993, Ammunition and Explosives Safety Standards and AR 420-90, 1992, Fire Protection.

COORDINATE WITH PROFESSIONALS

The principles of fire prevention in explosives and ammunition operations are similar to those for other activities. Coordination with the local fire fighters will enable them to provide assistance in the development of your program. See the professionals first.

CONSIDER THE RISKS

The details for any prevention program will depend upon the risks and likelihood of having fires. In assessing this risk, the sources of fire must be considered. Common sense is the rule in such an assessment.

- What is involved in the operation which may lead to fire?
- Is there equipment which may overheat?
- Are there flammable materials which can be removed from the vicinity?
- Has the weather been dry and therefore, add to the risk a fire will spread if started?

PLAN TO COMMUNICATE

Alarm transmission and communication must be agreed upon and understood by all before the operation begins. Simplicity is the key. Methods vary between locations, so don't assume everyone knows how to report an alarm and who to communicate with. Something as simple as knowing how to state where the fire is can save precious moments.

- Is there one system to report that can be used by all?
- Are phones available and do they have a label indicating their location?
- Is the radio net monitored by emergency responders?

The chain of reporting must be clearly indicated. It isn't enough to notify the fire fighters in some cases. As an example, a dispatcher may need to be notified to stop directing traffic into the fire zone.

The number of individuals to be notified should be kept to a minimum to assure the phone or radio lines don't get tied up with extraneous chatter. Know who should be notified IMMEDIATELY and then who after.

In cases where explosives are stored in structures, fire symbols may need to be posted on each structure or at the ends of rows. Whatever method is used, it is vital that personnel in the area know the meaning of the symbols. Have ALL personnel advised of the fire symbols.

In addition to symbols on buildings, there are Department of Transportation (DOT) placards used on vehicles. Both the symbols and placards should be understood by all personnel.

Be sure there are personnel available to provide instruction to firefighters and rescue personnel as they enter the area. Personnel evacuation is important, but it is equally important to be able to instruct arriving personnel where the fire is and what the conditions are. Conduct fire drills to assure evacuation detail is followed.

CONTROL SMOKING

Smoking areas must be clearly designated and controlled. At these locations, be sure a suitable ash receptacle is available as well as a fire extinguisher. Any lighters must be permanently installed and no other flame-producing devices allowed in the area. Include a housekeeping plan for the smoking area so waste doesn't accumulate. Have a clearly stated plan for keeping the smoking area clean and equipped.

HOT WORK PERMITS

When heat-producing devices are required for work, be sure the procedures are controlled by hot work permits (see chapter 3 of DAP 385-64). Advise maintenance personnel of the need to obtain hot work permits.

OVERSIGHT AND INSPECTION

In order to assure fire prevention plans work, it is necessary to assure there is appropriate oversight of the operations and conditions in the areas at risk. There will be fire inspections conducted by fire fighting personnel as required. However, there should be additional oversight by personnel familiar with the operations being conducted. For example, an accumulation of excess equipment may not present an immediate hazard. However, someone knowledgeable of the operation will know that there is a need for housekeeping to eliminate excess equipment and thus reduce the risk of fire. Assign personnel to conduct walk through inspections of the area.

CONTROL THE ELEMENTS OF FIRE

It isn't always practical to eliminate the various elements of fire. For example, packaging is an important part of safety with regard to ammunition. However, an excessive accumulation of packaging, while not immediately hazardous, may provide fuel for a fire if it starts.

It is possible to control elements of fire. Dry grass is a common source of fuel and many fires begin as a small grass fire. Having vehicles park in areas where the risk is low is a control. Use of water to wet the area before an operation may be practical. Assuring that fire beaters are available will reduce risks of spreading fire. A minimum of two fire extinguishes, suitable for the hazards involved, will be available for immediate use when explosives are being handled.

- Do vehicles with catalytic converters have to be used?
- Is there a parking area designated which is safe?
- Have electrical extension cords been inspected and are they being used correctly?
- Are there electrical devices in use which are unauthorized (e.g., radios)?
- Has the firebreak around the operation been maintained?
- Are flammable solvents necessary or can a less hazardous substitute be used?

A FIRE IS DISCOVERED

When personnel discover a fire near or involving ammunition and explosives, they should:

- Report the fire.
- Direct orderly evacuation of personnel.
- Notify personnel in nearby locations of possible dangers.
- Activate any remote means of extinguishing or controlling the fire (deluge, sprinkler system, etc.).
- Meet and advise the firefighters as to the details of the fire up to the time of their arrival.

WHEN TO FIGHT A FIRE

Do not fight a fire once the ammunition and explosives becomes involved in the fire. The heating of the ammunition or explosives by the fire makes it more likely to react energetically in a short period of time. Additionally, the heat supplied to most munitions can defeat/circumvent the safeties incorporated in the munition design. A high explosives (HE) projectile left in a fire, will in time, detonate. This detonation will produce a blast wave and hazardous fragments that puts personnel at risk. One exception is if the fire involves only hazard class/division (HC/D) 1.4S munitions. The effects of these munitions are generally confined to the immediate vicinity of the package. These fires can be fought by fire personnel using normal precautions from a reasonable distance (reference, 1993 DOT Emergency Response Guidebook).

Chapter 3 of DAP 385-64 gives specific instructions in the following situations:

- When a person discovers smoke or fire coming out from a closed magazine the person is to sound the alarm as quickly as possible and evacuate to a safe distance. The person will not enter the burning building or magazine, nor open the building or magazine door if the fire is noticed inside the magazine.
- If a fire is discovered in grass or other combustible material near a magazine (but does not yet involve the magazine or its contents), the alarm should be sounded immediately and employees should do all that is possible, using available fire fighting tools, to extinguish or control the fire until the fire fighting forces arrive.
- When a person discovers a fire in a building/magazine area where people are working and explosives are present, a suitable fire signal should be given and all personnel present will be evacuated. At least one responsible messenger will be dispatched in the direction from which the fire department is expected to approach, in order to inform them of the location, nature, and extent of the fire. The officer-in-charge of the firefighters will not permit the advance of personnel to a fire until accurate information is available about the existing hazard and concludes that he or she is justified in doing so.

If responding fire personnel see or suspect that ammunition and explosives are involved in the fire, the personnel should withdraw immediately. The DAP 385-64 and the 1993 DOT Emergency Response Guidebook have withdrawal distances published. If explosives are present but the HC/D is unknown, the greatest required withdrawal distance should be utilized.

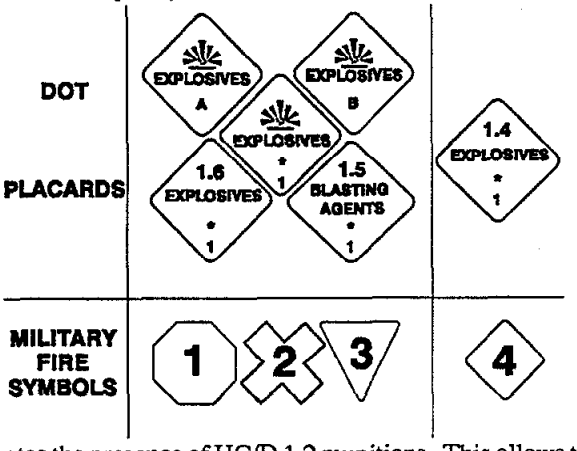
DOT PLACARDS AND FIRE SYMBOLS

There are two methods that can be used on U.S. Army installations for fire fighters to identify vehicles/structures containing ammunition and explosives.

<u>DOT PLACARDS</u> - DOT placards are used on vehicles or on transportation containers. They are generally not used on structures that contain ammunition and explosives. The major advantage of DOT placards is that all fire personnel are trained to properly respond when a fire involves DOT placarded materials. The drawback on the DOT placards is the relatively small size and lettering. Fire department personnel will react first to the color of the placard. All DOT

explosives placards are orange. The fire department will likely assume that HE are present as soon as they see an orange placard and not make an attempt to get close enough to read the hazard class and division of the explosives. A vehicle containing only HC/D 1.4S might be allowed to burn where that fire could actually be fought.

FIRE SYMBOLS - Fire symbols are unique to military installations. They are used on vehicles and structures. The major advantage of fire symbols is that they are larger and have different shapes for different divisions of explosives. For example, the octagon, stop sign shape, denotes HC/D 1.1 items, a X-shaped symbol, similar to a railroad crossing sign,



denotes the presence of HC/D 1.2 munitions. This allows the fire fighters to gain more information about the nature of the items involved in a fire from a distance.

CHEMICAL HAZARD SYMBOLS - Some military munitions contain a chemical filler, for example incendiary, smoke, riot control, as well as explosives. Special chemical hazard symbols are designed to inform the first responders of these hazards at a distance. These symbols are used on both structures and vehicles transporting these munitions. Some chemicals are water reactive, such as hexachloroethane (HC smoke) mixture, and require the Apply No Water symbol. Other symbols inform us of the respiratory hazards or the need to wear protective clothing. Fire fighters need to be aware of the meaning of these symbols and the emergency actions when they are encountered. Use of these symbols is military unique. Information concerning the chemical hazard symbols is contained in chapter 3 of DAP 385-64.

POST DETONATION ACTIONS

After a fire has caused a detonation in a storage structure/vehicle, it is possible that not all ammunition will be consumed. There is a good chance that some unexploded munitions will be projected from the explosion site. Projected munitions or sub-munitions must not be disturbed for any reason! The ejection and/or projection of a munition from a detonation can arm or partially arm the fuzing mechanisms of some munitions. The site should be secured to prevent any other personnel or civilians from touching or removing any munition or sub-munition. Firefighters should not perform overhaul operations (an intensive search for embers once the fire appears to be out) on a structure/location that has had a fire that involved ammunition or explosives or one that has had a detonation. For detonations/fires on the installation reports of the situation and requests for assistance should be made through command channels. For detonations that occur off the installation, for example transportation accidents, assistance can be obtained from the Army Operations Center (703) 697-0218/0219.

INSTALLATION ACTIONS TO SUPPORT FIRE FIGHTING

MAGAZINE CONTENTS LISTING- DAP 385-64 requires fire symbols to be used on structures/locations that store explosives. If all the magazines in a row or along a service road require a single fire symbol, then a single fire symbol at both ends of the road can be used. In either case, it is a good idea to provide the installation fire department with a list of the highest hazard contained in each structure (this list should be updated periodically as required). This is vital information needed by installation fire fighters in order to determine if a structural fire in the ammunition area can or should be fought.

FIRE EXTINGUISHERS - Government equipment transporting ammunition and explosives are required to have 2 fire extinguishers with a rating of 10 B:C. The B:C rating indicates that the fire extinguisher is designed to fight a liquid fuel fire or an electrical fire. Commercial vehicles hauling explosives are required to have one fire extinguisher with a rating of 10 B:C. Improvements in the military installation's fire fighting capability can be made by requiring that all fire extinguishers, on Government equipment, be rated to fight a class A fire (a fire that involves normal combustible products such as wood, paper, grass, etc.) in addition to the B:C rating. There have been instances were a B:C extinguisher was ineffective in fighting a class A fire. By including a 1A or 2A, 10 B:C fire extinguisher, the fire fighting capability of the installation will be greatly enhanced.

COORDINATION WITH CIVILIAN FIRE DEPARTMENTS

DAP 385-64 requires that familiarization training be given to civilian fire department officials that have mutual aid agreements with the Army installation that stores explosives. This will benefit the civilian departments, which probably have ammunition and explosives shipped through their communities, and foster a relationship of cooperation between the civilian and military installation fire departments. In transportation accidents that involve ammunition and explosives exterior to the military installation, the military installation fire department should offer support to the civilian department on scene. Civilian mutual aid fire fighting forces cannot be employed for an explosives response at a military installation, but can be used for support functions. Reference AR 420-90 and AR 385-14, 1991, Transportation Accident Prevention and Emergency Response Involving Conventional Munitions and Explosives requires that each installation have a military representative, major or above, able to be dispatched, in uniform, to the scene of an accident involving explosives.

DEPARTMENT OF THE ARMY
U.S. ARMY TECHNICAL CENTER FOR EXPLOSIVES SAFETY
SAVANNA, ILLINOIS 61074-9639
SMCAC-ESM
25

SITUATION: Fire not involving or supplying heat to munitions.
ACTION: Fight these fires only if sufficient personnel and equipment are on hand to extinguish the fire before it involves the munitions or supplies heat to the munitions. NOTE: fight HC/D 1.4S explosives fires with normal precautions.

SITUATION: Fire involving and/or suppling heat to the munitions.
ACTION: DO NOT FIGHT THESE FIRES! Evacuate all personnel, including emergency responders IAW the evacuation distances immediately. NOTE: If the fire is known to only involve items that are HC/D as 1.4S, the fire can be fought. Isolate the fire scene for 50 feet in all directions. Fight the fire remotely or use any cover available to fight the fire.

EVACUATION DISTANCES:

Building	4000 feet or 3/4 mile (300 feet for 1.4 explosives).
Rail Car	5000 feet or 1 mile (1500 feet or 1/3 mile for 1.4 explosives).
Truck	4000 feet or 3/4 mile (1500 feet or 1/3 mile for 1.4 explosives).

NOTES:
a. If only 1.4/S munitions are known to be present, evacuate civilian and non-essential personnel to 100 feet.
b. Evacuation distances on trucks can be reduced to 2500 ft or 1/2 mile if fragment producing munitions are known not to be present.

SITUATION: Transportation accidents (not involving fire).
ACTION: Deploy hose lines to fight any fire that may start. Assure no one touches or disturbs displaced munitions. Perform rescue operations as necessary. Do not touch any munitions that were projected from the accident scene.

SITUATION: Overhaul (examination for embers after fire is suppressed).
ACTION: DO NOT PERFORM IMMEDIATE OVERHAUL OPERATION. Call the Army Operation Center at (703) 697-0218/0219 for information regarding the start of overhaul operation.

SITUATION: Post fire/detonation actions.
ACTIONS: DO NOT TOUCH ANY MUNITIONS THAT MIGHT HAVE BEEN INVOLVED IN THE FIRE/DETONATION. Tape off and secure a wide area around the fire/detonation scene. Do not enter the area until it has been declared safe by explosives ordnance dispoal (EOD) personnel. Secure the area with the assistance of Security/Law Enforcement personnel.

by: Mr. Greg Heles
Log Mgt Spec
DSN 585-8877

and

Mr. Michael Wheless
QASAS
DSN 585-8806